REMARKS:

1. The applicant hereby responds to the Office Action mailed 09/03/2008.

2. Claim 11 was objected to because of a stated informality. In response, claim 11 is hereby re-written to cure the informality. As a result, this objection is traversed. It is noted that claim 11 is not amended, but only the last paragraph is indented to conform with the examiner's instructions.

3. Claims 1-4, 6-7, 9-11, 14-16, 18-23 and 25-28 were rejected under 35 USC section 103 as being unpatentable over Ketchum et al. (US 2003/0048856) ("Ketchum") in view of Dabak et al. (US Pat. No. 6,594,473) ("Dabak"). These rejections are traversed below.

4. As for claim 1, this claim reads:

> A method comprising:
> encoding a plurality of N systematic bits across time into an encoded packet of size M bits;
> determining a quality of at least a first channel from a feedback circuit;
> dividing the encoded packet into a first transmission packet defining a first size M_1 bits that includes N_1 of the N systematic bits and a second transmission packet defining a second size M_2 bits that includes N_2 of the N systematic bits, wherein at least one of M_1 and N_1 is based on the determined quality of the first channel; and
> transmitting in parallel the first transmission packet from a first antenna at a first rate at a first power modified by a first weight value over the first channel and the second transmission packet from a second antenna at a second rate that differs from the first rate and at the first power modified by a second weight value over a second channel, wherein M, M_1, M_2, N, N_1 and N_2 are all non-zero integers except one of N_1 and N_2 may be zero, M is greater than N, M is at least equal to M_1+M_2, and N is at least equal to N_1+N_2.
> (emphasis added)

As to Ketchum, as well summarized at its abstract, this reference details a MIMO transmission in which a common coding and modulation scheme are used to provide modulation symbols, which are then pre-weighted for each selected transmission channel based on the channel's characteristics. From all available MIMO channels, only the 'best' are selected for transmission while 'bad' channels are not used. Selection of these best channels is such that SNR for all of them are approximately similar, and so total available transmit power is distributed across these selected

transmission channels. The SNR of these selected channels are matched to the coding and modulation scheme that is used for transmission.

From this summary and as will be further borne out below, Ketchum fails to disclose that there is a different rate for parallel transmissions from different transmitting antennas. To make this aspect unambiguous, independent claims 1, 21 and 22 were previously amended to recite that the second rate differs from the first rate, support for which is clearly seen at page 7 lines 16-28, whereas the first and second rate element was previously added to independent claim 11. The following remarks take claim 1 as representative of this rate-per-channel distinction over Ketchum.

Ketchum discloses at para 0027 that a known technique is to use a particular coding and modulation scheme that is selected per channel based on CSI, but that approach is explicitly not within the parameters of Ketchum's specific teachings. Para 0028 concludes with the statement that different code rate and modulation per channel entails excessive complexity to implement, leading logically into para 0028 which begins with the succinct statement that an aspect of Ketchum's invention is that data *for all selected transmission channels* is processed using *a common coding and modulation scheme* to provide the modulated symbols. That channel-specific coding is excluded from what Ketchum considers its invention is explicit at para 0029: "Moreover, the selective channel inversion technique may also provide improved performance over the channel-specific coding and modulation technique due to ...". As detailed below, the common coding aspect is a condition precedent to the entire operation of Ketchum's MIMO transmissions, and so to change this pre-condition is to undermine the entirety of Ketchum's principle of operation.

As the Applicants read Ketchum, the principle of operation is that throughput capacity is optimized by selecting only the 'best' channels for transmissions and not using the non-selected 'bad' channels for transmission (abstract, paras 0028, 0032, 0088 and Figure 2B block 266). Because these selected channels purposefully have similar SNR, this enables the available transmit power to be distributed across only those selected channels (para 0028, 0034, with para 0033 describing disadvantages of

using all transmit channels as higher variation in symbol error probability and associated loss in bandwidth efficiency). Transmission channel inversion is one technique Ketchum details to find these SNR-matched good transmission channels (paras 0033-0066 and Figure 2A).

Note Ketchum's block 218 of Figure 2A where during the process of determining weighting factors to apply to the different transmission channels, the channel power gain is compared to a power gain threshold. Since these weights are applied to the transmit power used for the various transmission channels, it is clear that the transmissions are to be at the same coding rate since a same coding rate is a condition by which they were each determined. Ketchum details at paras 0067- 0084 how an optimum threshold is selected, and unambiguously shows at 0075 that any particular n^{th} threshold that might be used for the weight calculation is associated with an n^{th} code rate. At Figure 2A, every single one of the transmission channels is evaluated at block 218 against the same rate-specific threshold, which was settled upon at block 214. The selection of Ketchum's channel weights therefore assumes a single code rate for the transmissions.

The same single-rate concept holds true at Ketchum's Figure 2B which describes how Ketchum selects the N_s channels that are to be used for transmission. Para 0033 explicitly states a common coding and modulation, and a single coder and code rate for encoding data for *all* transmission channels. Block 258 of Figure 2B clearly shows that a largest number *I* of best transmission channels is found that achieve the setpoint required *for the code rate* r_n. While block 250 provides for evaluating the available channels against different code rates by using different rate-specific setpoints, the output of the iterative loop in Figure 2B is a largest number *I* of transmission channels *for a single* n^{th} *rate*, which n^{th} rate is explicitly stated at supporting para 0087. The threshold, which is also specific to the nth code rate, is evaluated for the nth setpoint at block 260. This is how Ketchum selects a proper set of transmission channels. Without such a threshold, certain channels would demand too high a power to compensate for poor SNR (see para 0033 for disadvantages for channels with widely varying SNR), undermining Ketchum's goal of optimizing throughput. Using different rates defeats the

purpose of SNR-matching the selected channels.

Referring briefly to the Office Action mailed 03/12/2008, the examiner's citation therein to Ketchum's Table 1 and related text at paras 0103 and 0106 are seen to be misplaced. Table 1 does not show per-channel rate, but the different rates that are appropriate to the SNR ranges that are determined for the selected (or available) transmission channels. The examples at para 0103 bear this out in that each of the three different examples references only one coding rate to achieve the target of one information bit per modulated symbol. Though each example recites a coding rate different from the other examples, it is not a different coding rate for different antennas. These examples present as alternatives from which one may choose, given a SNR range for the selected channels. Regardless of the choice, all selected transmit antennas will transmit using the single coding rate that is particular to that choice, and all non-selected transmit antennas will not be used.

Ketchum clearly relies on a single coding rate for each parallel transmission from the different MIMO transmit antennas. Therefore claim 1 is not anticipated at least for its recitation of different first and second rates. All other independent claims similarly distinguish.

It is asserted and has been shown above that a single coding rate across all transmission channels is condition precedent to the entire Ketchum principle of operation. Therefore no prior art of record is seen to make it obvious to change Ketchum to a per-channel coding regimen. Such an adaptation would require such a fundamental and extensive rework of the Ketchum approach as to be well beyond ordinary skill.

Referring now to the present claim 1, with respect to the underlined claim passages, the Office Action concedes that Ketchum does not show transmission on different channels at different rates. Office Action, page 6, lines 3-6. However, the examiner asserts that Drabak provides this limitation. Specifically, the examiner states that in Drabak, applying different closed loop weight factors W1 and W2 causes transmissions in channels 44 and 46 to be at different rates. The applicant respectfully disagrees. With reference to Drabak's Figure 4, the closed loop weight factors W1 and

W2 are applied to multipliers 44_M and 46_M, respectively. While these weight factors W1 and W2 adjust the values of the transmitted signals on channels 44 and 46 they do not, however, adjust the transmission rates themselves. Moreover, there is no disclosure or suggestion elsewhere in Drabak or Ketchum, alone or in combination, to perform different transmissions at different rates. Analysis: As to Drabak, every W factor is a power weighting. This is fundamentally because Drabak's open/closed loop diversity system provides power control over multi-paths. As such, the transmission rate is irrelevant in Drabak. In contrast, claim 1 talks of both power weights and different transmission rates. Moreover, the examiner's characterization applies to two (2) entirely different transmissions in Drabak, which could not arise from dividing a single encoded packet, as claim 1 recites.

As a result of the above analysis, claim 1 is allowable over Ketchum and Drabak.

Claims 2-4 and 6-10 are dependent on claim 1. As a result, these claims are allowable at least on the grounds that they depend on their common parent claim 1 which, as shown above, is itself allowable.

As an additional matter, the Office Action mailed 03/12/2008 appears to assert that a single antenna embodiment of Ketchum anticipates claim 1. This is seen to be improper on its face. While the terms of claim 1 provide that either number N_1 or N_2 (representing numbers of systematic bits) may be zero, claim 1 also specifies that the size of the packets M_1 and M_2 are non-zero. An example is that one of the packets M_1 and M_2 has only parity bits and no systematic bits and the other has all N of the systematic bits (e.g. claim 3). The comments at page 3 in this 03/12/2008 Office Action rejection of claim 1 appear to rely on either M_1 or M_2 being zero, which claim 1 excludes. Claim 1 further recites transmitting in parallel from the first and second antennas, and so to read this claim as anticipated/obvious in view of a single antenna embodiment is seen to improperly read out the parallel transmission element of the claim.

Relatedly, claims 2-3 are clearly beyond Ketchum regardless of the above argument respecting claim 1, because Ketchum has no transmission in which no information bits are sent (claim 3, N_2 systematic bits = 0) and makes no distinction as to

which stream might carry more or less of the N systematic bits (claim 2, maximize N_1). The rejection of these claims is seen to follow the misinterpretation of Table 1 and related text, as detailed above.

5. As for claim 11, this claim reads:

> A device comprising:
> an encoder having an input for receiving a plurality of N systematic bits and an output for outputting a plurality of M bits, wherein M is greater than N;
> a channel feedback circuit for determining a channel characteristic of a first communication channel;
> a demultiplexer having an input coupled to an output of the encoder and an input coupled to an output of the channel feedback circuit, said demultiplexer for outputting in parallel a first portion M_1 of the M bits at a first output and a second portion M_2 of the M bits at a second output;
> a first amplifier coupled to said first output for increasing a power of said first portion M_1 of the M bits;
>
> a first antenna coupled to the first output for transmitting at a first rate said first portion M_1 of the M bits;
> a second amplifier coupled to said second output for increasing a power of said second portion M_2 of the M bits;
> a second antenna coupled to the second output for transmitting, at a second rate that differs from the first rate, said second portion M_2 of the M bits; and
> a first eigenvector block in series with the first output, said first eigenvector block coupled to said first and said second antenna for applying a first power weight factor to said first portion M_1 of the M bits prior to transmission from said first antenna and for applying a second power weight factor to said first portion M_1 of the M bits prior to transmission from said second antenna.
> (emphasis added)

With respect to the underlined passages, the Office Action conceded that Ketchum does not show transmission on different channels at different rates. Office Action, page 12, lines 12-14. However, the Office Action stated that Drabak provided this limitation. Specifically, the examiner states that in Drabak, applying different closed loop weight factors W1 and W2 causes transmissions in channels 44 and 46 to be at different rates. The applicant respectfully disagrees. With reference to Drabak's Figure 4, the closed loop weight factors W1 and W2 are applied to multipliers 44_M and 46_M, respectively. While these weight factors W1 and W2 adjust the values of the

transmitted signals on channels 44 and 46 they do not, however, adjust the transmission rates themselves. Moreover, there is no disclosure or suggestion elsewhere in Drabak or Ketchum, alone or in combination, to perform different transmissions at different rates. See the above analysis for claim 1, which is equally applicable here. As a result, claim 11 is allowable over Ketchum and Drabak.

Claims 14-20 are dependent on claim 11. As a result, these claims are allowable at least on the grounds that they depend on their common parent claim 11 which, as shown above, is itself allowable.

6. As for claim 21, this claim reads:

> A method comprising:
> encoding a plurality of input bits;
> based on a determined characteristic of at least a first channel,
> adaptively splitting the encoded input bits into a first subpacket defining a first subpacket size and a second subpacket defining a second subpacket size; and
> transmitting the first subpacket at a first rate and at a first power modified by a first weight value over the first channel and the second subpacket at a second rate that differs from the first rate and at the first power modified by a second weight value over a second channel.
> (emphasis added)

With respect to the underlined passages, the Office Action conceded that Ketchum does not show transmission on different channels at different rates. Office Action, page 17, lines 6-9. However, the Office Action stated that Drabak provided this limitation. Specifically, the examiner states that in Drabak, applying different closed loop weight factors W1 and W2 causes transmissions in channels 44 and 46 to be at different rates. The applicant respectfully disagrees. With reference to Drabak's Figure 4, the closed loop weight factors W1 and W2 are applied to multipliers 44_M and 46_M, respectively. While these weight factors W1 and W2 adjust the values of the transmitted signals on channels 44 and 46 they do not, however, adjust the transmission rates themselves. Moreover, there is no disclosure or suggestion elsewhere in Drabak or Ketchum, alone or in combination, to perform different transmissions at different rates. See the above analysis for claim 1, which is equally applicable here. As a result, claim 21 is allowable over Ketchum and Drabak.

7. As for claim 22, this claim reads:

> An apparatus comprising:
> an encoder to encode a plurality of input bits;
> a demultiplexer, having an input coupled to an output of the encoder, to adaptively split the encoded plurality of bits into a first subpacket defining a first subpacket size and a second subpacket defining a second subpacket size;
> a first antenna coupled to an output of the demultiplexer, to transmit the first subpacket at a first rate and at a first power modified by a first weight value over a first channel; and
> a second antenna coupled to an output of the demultiplexer, to transmit the second subpacket at a second rate that differs from the first rate and at the first power modified by a second weight value over a second channel.
> (emphasis added)

With respect to the underlined passages, the Office Action conceded that Ketchum does not show transmission on different channels at different rates. Office Action, page 20, lines 1-4. However, the Office Action stated that Drabak provided this limitation. Specifically, the examiner states that in Drabak, applying different closed loop weight factors W1 and W2 causes transmissions in channels 44 and 46 to be at different rates. The applicant respectfully disagrees. With reference to Drabak's Figure 4, the closed loop weight factors W1 and W2 are applied to multipliers 44_M and 46_M, respectively. While these weight factors W1 and W2 adjust the values of the transmitted signals on channels 44 and 46 they do not, however, adjust the transmission rates themselves. Moreover, there is no disclosure or suggestion elsewhere in Drabak or Ketchum, alone or in combination, to perform different transmissions at different rates. See the above analysis for claim 1, which is equally applicable here. As a result, claim 22 is allowable over Ketchum and Drabak.

Claims 23-28 are dependent on claim 22. As a result, these claims are allowable at least on the grounds that they depend on their common parent claim 22 which, as shown above, is itself allowable.

8. Should any unresolved issue remain, the Examiner is cordially invited to call Applicants' attorney at the telephone number indicated below.